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Working Paper

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Discussion Papers Series, No. 07-21

Provided in Cooperation with:
Utrecht University School of Economics (U.S.E.), Utrecht University

Suggested Citation: Cefis, Elena; Grondsma, M.; Sabidussi, A.; Schenk, E.J.J. (2007) : The role of innovation in merger policy: Europe's efficiency defence versus America's innovation markets approach, Discussion Papers Series, No. 07-21, Utrecht University, Utrecht School of Economics, Tjalling C. Koopmans Research Institute, Utrecht

This Version is available at:
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Tjalling C. Koopmans Research Institute

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The Role of Innovation in Merger Policy: Europe's Efficiency Defence versus America's Innovation Markets Approach

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September 2007

Abstract
Changes in the world's economies and discussions in the literature about the growing importance of innovation to firms have given rise to a demand for expanding the analysis of merger policy. The present study focuses on the different criteria used to assess the impact of M&A activities on innovation. The analysis is both theoretical and empirical. From a theoretical perspective, two main approaches are discussed: the efficiency defence approach, adopted in Europe, and the innovation markets doctrine as developed in the United States. The present paper contributes to the literature by suggesting that an integration of the two approaches would significantly improve M&A assessment. On the empirical side, two cases that have been scrutinised by both the European Commission and the U.S. Federal Trade Commission are discussed. The results show the relevance of the different approaches used when dealing with innovation in the assessment of mergers.

Keywords: Mergers and Acquisitions, Innovation, Efficiency Defence

JEL classification: C14, D21, L11, L25

Acknowledgements
The authors would like to thank Onno Omta and Emiel Wubben for useful discussion and Mihaela Ghita for assistance. Authors Cefis, Sabidussi and Schenk gratefully acknowledge the financial support of NWO (Dynamics of Innovation Programme, grant no.: 472-04-008). Cefis also acknowledges the financial support of the University of Bergamo (grant ex 60%, n. 60CEFI06, Dept. of Economics).

I. Introduction

One of the ways in which a merger could fail to generate or would even destroy wealth would be if it results in increasing the firms' market power without compensating for this by parallel improvements in the productivity of the parties to it or in the quality of the products or services offered by the partner firms. More precisely, and using the wording that will be defined further below, this would be the case if a deterioration of allocative efficiency is not compensated for by an increase in productive (or internal) efficiency, transactional efficiency and/or dynamic efficiency.

Another would be if a merger would put the merging parties into a position in which they could painlessly reduce their innovation efforts, without such reductions being compensated by other parties in the market. Related to this possibility would be the case in which a merger reduces the pressure of market parties to innovate.

Evidently, and given the periodically high incidence of mergers and acquisitions (M&A) [1], the way in which economies appreciate mergers—i.e. deal with potential benefits and disadvantages—may be of crucial macroeconomic importance.

To this end, most industrialised economies have developed merger control regulations, mostly as part of competition or antitrust policies. Competition laws are currently aimed at encouraging market competition and at discouraging market structure or activities that would result in the exercise of market power. Market power represents for a firm the possibility to independently raise prices above market level without losing sales. Market dominance is an extreme form of market power. It is defined by the European Commission as 'a position of

[1] In this paper, we will use the terms merger and acquisition interchangeably, unless noted otherwise.

economic strength enjoyed by an undertaking which enables it to prevent effective competition being maintained in the relevant market by affording it the power to behave, to an appreciable extent, independently of its competitors, customers, and ultimately consumers'. Until recently, in the European Union, a merger was simply declared incompatible with the common market if it resulted in a market concentration that would tend to create such a position.

In the new EC Merger Guidelines (2004/C 31/03), however, a special section has been dedicated to efficiencies. The Guidelines now allow firms, whose merger is challenged or not allowed based on competition arguments, to plead a so-called efficiency defence. The European Commission will consider any substantiated efficiency claim if there is enough evidence that the efficiencies generated by the merger are likely to enhance the ability and incentive of the merger firms to act pro-competitively, i.e. to the benefit of the consumers. Similarly, in the U.S., an efficiency defence was introduced in 1982, following an influential paper discussing the plausibility of a welfare trade-off, i.e. a trade-off between anticompetitive effects and efficiency gains (Williamson 1969).

Consumers' surplus, but more in general, society's surplus, can be enhanced not only if existing products have lower prices but also if radically new or improved products are introduced in the market. Society benefits from innovation by taking advantage from the development of new or improved products or new processes aimed at increasing productive efficiency. Achieving lower costs has greater welfare consequences. Price reduction represents simply a transfer of economic benefit from the producer to the consumer while a reduction in costs represents a net economic benefit for society as a whole, by making available resources that can be deployed in other economic activities . On the other hand,

radical innovation in products and processes may result in a significant increase in production and/or in living standards.

Understanding the effects of mergers and acquisitions on the innovative activity of firms is, therefore, important. Whereas it is commonly accepted that innovation is an instrument of economic progress, the relation between market structure and innovation remains controversial while the relation between mergers and innovation has been studied only rarely.

In this respect, efficiency defence considerations would apply to cases in which it is the purpose of the merging parties to argue that innovation will be enhanced. However, mergers may also impact negatively on future innovation. This effect might occur in two respects. First, a merger may affect the merged parties' innovative capabilities, for example as a result of increasing bureaucracy, internal competition, or economising behaviour. Secondly, if the merger creates market power, it may affect the pressure towards innovation among competitors.

From the literature, it appears likely that mergers and acquisitions have a negative effect on R&D investments, R&D investments relative to the industry average, and R&D output except for some industries, most notably the chemical industry (Scherer, 1984; Ravenscraft and Scherer, 1987). Hitt et al (1991) studied the effects of 191 US acquisitions on both R&D expenditures and results. Total R&D expenditures were divided by total sales and adjusted for average industry R&D-intensity. R&D performance was expressed as the number of patents registered divided by total sales. The results show that the acquisition variable, after size, leverage, return on assets, and liquidity were controlled, was a statistically significant, negative predictor of R&D intensity adjusted for industry. The results for patent intensity were similar, so that it was possible to conclude that mergers do not necessarily have

synergetic effects in terms of innovation. In a follow-up study, Hitt et al. (1996) confirmed this for a sample of 250 firms for which R&D data were available for 1985-1991. Again, a significantly negative relationship between acquisition and innovation was found.

Similar, but mostly insignificant results were found by Hall (1999) in a study of 6000 quoted firms. This somewhat weaker result can probably be explained by the fact that Hall's sample included many fourth-wave mergers that were strongly leveraged. Indeed, she did find a strong, negative connection between leverage and post-merger R&D investments. According to Hall, her results clearly demonstrate that mergers do not by definition have positive economies of scale or scope effects on R&D. The results applied for classical as well as so-called R&D intensive industries.

Additional arguments would have to draw on indirect evidence, i.e. on evidence concerning the relationship between size and innovation. Well known is Schmookler's (1972) study, which confirmed an even earlier and at the time quite surprising study by Cooper (1964) that had found small firms to be three to ten times more productive in development than large firms. Schmookler then found that firms with more than 5000 employees trail small firms in the number of patented inventions, the percentage of patented inventions used commercially, and the number of significant inventions. Anecdotal interview evidence gathered by Cooper suggested that small firms would be able to hire more productive and cost-effective R&D personnel because of better working and incentive conditions.

The economic literature discusses additional methods of increasing the role of dynamic effects in merger policy. The addition of the US and EU Horizontal Merger Guidelines includes efficiencies in the assessment of markets in specific cases. The two most meaningful theories enlarging the perspective of merger analysis are the efficiency defence and the

innovation markets approach.

This paper aims at analysing the role played by innovation in current merger policies. From a theoretical point of view, the study will discuss the different approaches adopted by the European and American authorities when dealing with innovation in assessing M&A activities. The empirical analysis is aimed at testing the relevance of the arguments raised in concrete cases. The selected cases have been assessed by both the EC and the FTC to allow a comparison. The cases are chosen from horizontal mergers in high-tech industries because horizontal mergers have a larger potential to increase market concentration or dominance and innovation plays a more significant role in high-technology industries than in low-technology industries.

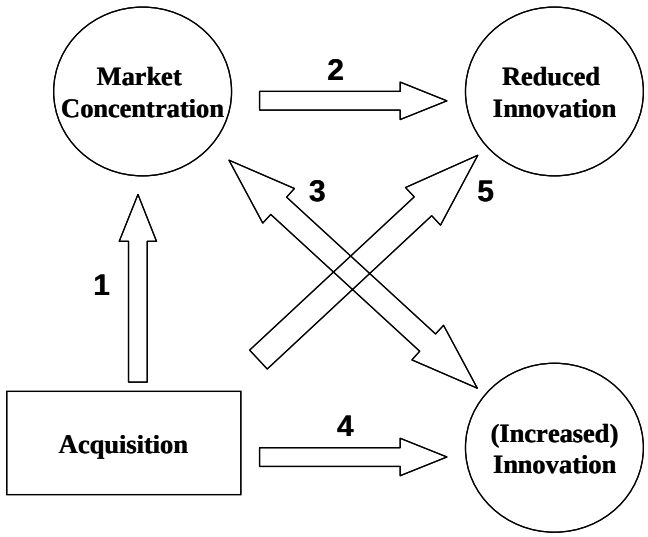
II. Effects of M&As on innovation

The increasing role played by innovation activities in achieving greater economic growth and social welfare increases also the importance of understanding the effect of M&As on innovative activity . If it is commonly accepted that innovation is an instrument of economic progress, the idea of market structure stimulating innovation remains still less clear. Regulation authorities foresee the effects on welfare by the dominance of firms or concentration in the market and therefore the relation between market concentration and innovation is also important.

The direct effect of M&As on innovative activity and the effect of an increased market concentration as a result of an acquisition are examples and shown in Figure 1 by arrows 4/5

and arrow 1 respectively.

Figure 1. Acquisition, innovation and market concentration



Determining whether increased market concentration leads to reduced innovation (arrow 2 in Figure 1) or to no change or an increase in innovation (arrow 3 in Figure 1) is vital to the decision process.

Innovation activities are important means of competition among firms, especially in high-tech industries (Schumpeter, 1936 and 1942). Process innovation increases efficiency and reduces the cost of production making a firm more competitive in its existing markets. Product innovation increases product quality or creates new products for new markets. Firms with leading innovation activities increase their chances of survival and possibly their profitability. In acquisition cases, efficiency arguments are widely used as a means to justify the proposed transaction. However, economic studies show that only a small amount of firms succeed in actually realizing the synergies and thereby in making the transaction profitable

(Schenk 2006). With respect to the effects on innovation, the economic literature is limited.

A complete analysis of the M&A effects on innovation[2] is beyond the scope of this paper since the research area is relatively new and most results are inconclusive (Cohen and Levin 1989). However, some understanding is required since theoretical insights play a significant role in the decision context. Schumpeter (Schumpeter 1942) suggests a relationship between firm size, concentration and innovation. Similarly, Schmalensee (Schmalensee 1989) focuses on two hypotheses derived from the Schumpeterian tradition, 1) innovation increases with firm size and 2) innovation increases with market concentration[3]. The importance of these two factors with respect to merger policy is evident, since horizontal acquisitions can affect both.

Though there are numerous empirical studies ((Cohen and Levin 1989), (Scherer 1980), (Bound, Cummins et al. 1984) and (Cremer and Sirbu 1978) investigating these two hypotheses, their results are mixed. The use of proxy variables for innovation and the methodological problems involved reduce the significance of the acquired results. Furthermore, several factors that correlate with firm size and concentration can very likely be correlated with innovation as well. Differences found between industries also need to be corrected in order to create a general framework[4].

The above discussion does not lead to a definitive conclusion on the effects of firm size and market concentration on a firm's innovation activities. In horizontal acquisitions these two relations are clearly important since the influence of acquisition activity, especially between larger firms, on these two factors can be significant. Investigating the direct effects of mergers

[2] Shown by arrows 4 and 5 in figure 1

[3] This concerns the relations shown by arrows two and three in figure 1.

[4] A more detailed discussion of the industry characteristics can be found in Cohen and Levin (1989).

on innovation[5] may provide useful insights.

Acquisitions are a complicated economic phenomenon with complex underlying processes that influence the eventual outcome of the transaction. In a theoretical perspective, acquisitions can improve innovation activities of firms because of economies of scale and scope. A merger involving firms in the same market can eliminate duplicative research, combine research efforts for more efficiency or increase the diversity of the research programs (Ernst and Vitt 2000). It is also argued that acquisitions create factors with a negative impact on innovative activity. One of these mentioned by Hitt et al (1998) is the effect of the increase in debt that often results from acquisitions. This can cause companies to forego on riskier investments, i.e. research and development that they would have invested in without the acquisition. Several empirical studies (Hitt et al (Hitt, Hoskisson et al. 1991), Healy, Palepu and Ruback (Healy, Palepu et al. 1992), Hitt et al (Hitt, Hoskisson et al. 1996) among others) have been performed to understand the effects of acquisitions on innovation activity.

Hitt et al (Hitt, Hoskisson et al. 1991) make the distinction between innovative input and output[6] and investigate how these are affected by acquisitions. They find that acquisitions have a significant negative effect on R&D input as well as on R&D output. The latter is mainly caused by the diversification involved in the acquisition while diversification was insignificant with respect to R&D input. The negative relation with respect to R&D input can be explained by the economies of scale and scope, which can lead to reduce inputs but higher

[5] Shown by arrows 4 and 5 in Figure 1.

[6] The authors define innovative input as R&D expenses divided by sales and corrected for average industry R&D expenses. Innovative output is defined by the number of patents held divided by total sales.

or equal outputs. But since the data showed a decline in both inputs and outputs of the firms involved in the acquisitions relative to their competitors, this argument loses ground.

Healy, Palepu and Ruback (Healy, Palepu et al. 1992) have investigated the effects of acquisitions on corporate performance for the largest 50 acquisitions between 1979 and mid-1984. They find that acquisitions do not lead to decreases in long-term capital expenditures and R&D investments. However Hitt et al (Hitt, Hoskisson et al. 1996) in another study of the industrial manufacturing segment in the period 1985-1991 find that acquisition intensity is negatively correlated to internal firm innovation, thus indicating a clearly different effect.

There is significant evidence pointing at the importance of the fit of the acquired company into the acquirer ((Ahuja and Katila, 2001; Cassiman, Colombo et al., 2003; Cassiman, Colombo et al., 2005). The more related companies are, up to a certain point of relatedness, the better their performance with respect to R&D input and output than less related companies. This conclusion can be a possible explanation for the difference in results of the empirical studies. Studies that contain data on unrelated companies committing on acquisitions can show (more) negative results when the researchers do not correct for relatedness of the companies, and vice versa7.

This brief overview of empirical studies is showing once again that available results are quite diverse, raising new questions and opening the path for further research.

3.III. The Efficiency Defence and the Innovation Markets debate

III.1. The Efficiency Defence

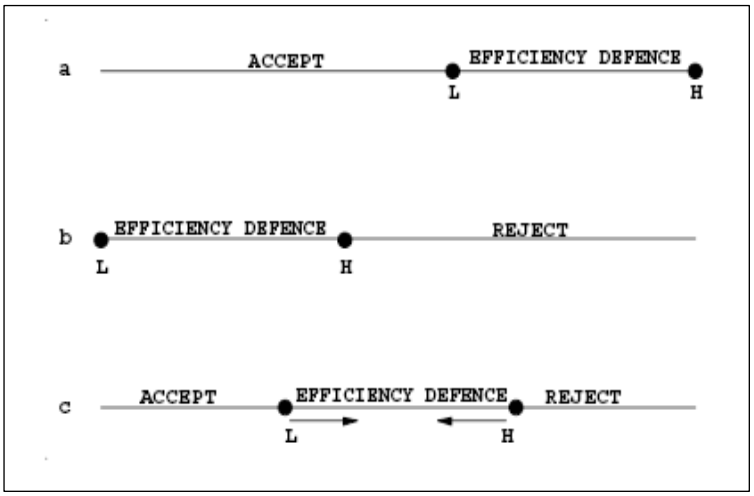
Restrictions to prevent harmful acquisitions have been created both at national and at international level, taking into account that one of the possible effects of acquisitions is the increase in market power of the acquiring firm. The current structure of the EC competition regulations contains a lower and an upper threshold as shown by option C in Figure 2 (Röller, Stennek et al. 2006); acquisitions that are below the lower one are not considered harmful and do not need approval by the commission. Acquisitions that are above the upper threshold are considered harmful by definition and are not allowed. Between these two segments there is a grey area where acquisitions need to be further investigated to determine the effects on all factors involved. This is where companies have the possibility to defend their proposed acquisition and prove that the transaction does not impede effective competition significantly or that other factors offset the effect on competition. One of these factors is efficiency. In the past the companies' defence was limited to showing that the anti-competitive effects were absent and increased market concentration or market power would not occur. This however, neglects possible efficiencies and synergies that may occur from the proposed merger and that can have a positive effect for economic welfare. It is likely that in some cases the anti-competitive effects of a proposed acquisition can be countered by efficiencies that result from the transaction. These can cause an increase in welfare that offsets the negative effect of the increased market concentration or market power. In these cases, prohibition by the authorities might not be the optimal solution.

The new orientation following from the EU Horizontal Merger Guidelines (2004) states in

article 78 that “the efficiencies have to benefit consumers, be merger-specific and be verifiable” and that “as a consequence of efficiencies, there are no grounds for declaring the merger to be incompatible with the common market”. This forms the foundation for an efficiency defence in European merger policy.

When a proposed merger has to be subjected to further investigation by the competition authorities, the firms involved may wish to defend their proposed transaction. In the past such a defence was limited to showing that the alleged anti-competitive effects were absent and increased market concentration or market power would not occur. This, however, neglects possible efficiencies and synergies that may occur from the proposed merger and that can have a positive effect on economic welfare. It is possible that in some cases the anti-competitive effects of a proposed merger can be countered by such productive efficiencies (Williamson, 1968). These can cause an increase in welfare that offsets the negative effect of the increased market concentration or market power. In these cases, prohibition by the authorities might not be the optimal solution for society.

Figure 2. Different combinations of thresholds



The figure shows different combinations of the lower and upper thresholds. The placement of the thresholds determines the area where the efficiency defence is applicable. (Source: Röller, Stennek and Verboven ({Röller et al, 2006)

It is important to make a distinction between different welfare types. An acquisition that creates large efficiencies for the companies and also increases their market power, leading to an increase in producer surplus might increase total welfare but can seriously harm the welfare of consumers. To deal with this distinction four different welfare criteria have been developed. The choice between these criteria depends largely on the aim of the authorities but the two most widely used are the total surplus and consumer surplus criteria. According to the total surplus criteria (Williamson 1968), an acquisition should be allowed when the increase in producer surplus offsets the loss in consumer surplus, thereby increasing total welfare. Welfare distribution is thus completely neglected. The consumer surplus criteria considers distributional issues: for an acquisition to be allowed, it must be beneficial also to consumers.

In the midst of these two is the Hillsdown[8] criteria, which states that the efficiencies must be larger than the loss to consumers. The fourth is the so-called killer criteria and it requires all efficiencies to be passed on to consumers. This is the least important one since it requires a perfectly competitive market and its applicability is therefore very limited (Röller, Stennek et al. 2006).Though not clearly mentioned in the guidelines, the EC applies the consumer surplus criteria point of view. This follows from the three conditions that need to be met for efficiencies to be taken into account: 1) Efficiencies need to be of direct benefit to consumers, either by lower prices or new and improved products or services, 2) efficiencies are merger-specific and 3) efficiencies are verified and, as far as possible, quantified (Ilzkovitz and Meiklejohn 2003).

[8] The Hillsdown criteria follows from the Canadian merger case Hillsdown holding/Canada Packers Inc (Canadian Competition Tribunal, Reasons and Order Case CT-91/1).

In the literature the term “efficiencies” is used as a general term describing any gains from an acquisition. Efficiencies can be grouped in three main categories: production, allocative and dynamic efficiency. Since most authorities use the consumer surplus criteria, only those efficiencies that affect this type of welfare can be used in the defence of a proposed acquisition. Furthermore, the gains need to be acquisition-specific. The distinction between efficiencies and synergies is useful here.

Synergies are a specific type of efficiencies that can only be realized by combining activities of different firms. Companies may realize economies of scale after the acquisition and see this as an increase in efficiency, which it is. However, if these gains are not large enough the companies could have achieved them in a non-merger situation, which is preferable from a consumer’s point of view since the increase in market concentration will be much smaller. These efficiencies are therefore not acquisition-specific and cannot be named synergies.

When the value of production efficiency is high enough, companies can achieve them in other ways than by acquiring another firm. Therefore only dynamic efficiency gains can be used by companies to justify the transaction, since production and allocative efficiencies can be acquisition-specific only in exceptional cases.

In contrast to the static production and allocative efficiencies, dynamic efficiencies involve a timeline. Instead of a relative fast shift from one situation to the next, as is the case with rationalization of output for example, dynamic efficiencies involve gradual or stepwise changes over time. Innovation is a clear example of a dynamic efficiency as it contains different stages (R&D,, implementation). Furthermore, it requires very specific input: technological know-how or technologies and products that might have already been patented.

These factors increase the likelihood that the efficiencies are acquisition-specific.

Röller, Stennek and Verboven (2006) use the concept of the production function to distinguish between efficiencies that are more or less likely to be approved by the authorities in an efficiency defence. The efficiency defence does not consider redistributive savings but only real cost savings . Real cost savings indicate savings in productive resources, and are more likely to benefit consumers. However, a reduction in fixed costs as a result of technological progress is less likely to benefit consumers than a decrease in variable costs, since its impact on the marginal cost of production is higher. The last two distinctions made by the authors are based on information asymmetry aspects between the firms involved in the acquisition and the authorities. The final distinction is between benefits in the relevant market and other markets. Though both can be equally important, implementing the effects in other markets is more ambiguous and introduces additional complications.

It seems that the main arguments supporting the implementation of an efficiency defence are that a broader range of factors with influence on consumer welfare can be included in the analysis of a proposed merger. This has the effect of decreasing the possibility that regulation authorities prohibit acquisitions with beneficial effects on consumer welfare as a result of efficiencies. Ilzkovitz and Meiklejohn (Ilzkovitz and Meiklejohn 2003) noticed that disregarding efficiencies in merger policy in the EU could be harmful to firms, since globalization requires firms to be more and more efficient in order to remain competitive.. The implication is that the relevant geographic markets need to be expanded, with the result that anti-competitive concerns are less likely to be present (Ilzkovitz and Meiklejohn, 2003). In economic terms it would result in an increase in firms with dominant positions in European markets, with negative effects on the other firms in the market and consumer welfare (Fox

1995). However, an efficiency defence applying the consumer surplus criteria would prevent (or at least limit) the welfare loss to consumers.

The main problem of the efficiency defence relies on the realization of the projected efficiencies. If these do not occur, authorities have permitted a concentration with negative effects to the market and possibly to consumers as well. This is a serious problem since many acquisitions fail to realize the goals they set to achieve. In many cases a firm's key indicators of success, such as rate of profits or total sales, decreases after an acquisition (Tichy, 2001). In order for the efficiency defence to be a worthy addition to current merger policy, only relatively certain and verifiable efficiency claims should be accepted by the authorities. This results in the approval of only a relatively small number of acquisitions that offer significant efficiency gains. Though the value of allowing these types of mergers that would otherwise be prohibited is significant, the total value added by the defence is limited.

As with all reforms of policies, selecting the correct implementation approach is vital to the success of the modification. The literature suggests three possible approaches for the efficiency defence. The first is the general presumption approach that uses a similar method as the current analysis of the creation of a dominant position by creating thresholds at certain levels (this is visualized in figure 2). A major advantage is that the extra costs involved are kept at a minimum, but it also has the largest risk of decision error (Type I error, that is to reject a merger that is not anti-competitive and Type II error, that is to approve a merger that is anti-competitive). The second approach involves a case-by-case analysis of the efficiencies and their effects. Though this is the most accurate method it is also the most costly and time-consuming. The final approach combines the previous approaches and creates a grey area (the area between the lower and upper threshold of option c in figure 2). Only mergers in the

grey area are investigated in-depth. This option provides the best solution for the trade-off between time/costs and accuracy and is consistent with the Horizontal Merger Guidelines (2004)

The arguments presented above point towards a willingness of both politicians and economists to implement the efficiency defence and to increase the scope of the pre-merger analysis despite the inherent difficulties accompanying this process.

III. 2. The innovation markets approach

No matter the approach or the role and procedures to be adopted by the antitrust authorities, the starting point is always that of identifying a specific market where competition must be protected to enhance consumers' wealth and social well-being. When the impact of a merger on competition has to be assessed, two perspectives are possible. One focuses on existing markets and on facts that exist at, or prior to, the time of the merger, the other focuses on the impact on future markets. The first approach is defined as static, the second as dynamic and forward-looking.

In the mid 1990s, the Innovation Markets debate enriched the discussion by adding the idea that a special future market should be taken into account by antitrust authorities when valuating the impact of a merger: the market of innovation. Section 7 of the Clayton Act prohibits a merger that "may be substantially to lessen competition or tend to create a monopoly". Antitrust Division and Federal Trade Commission have generally interpreted it for mergers that are likely to affect prices in relevant products and geographical markets. The reason is that it is easier to assess the effect of a merger on a quantifiable dimension like

prices. Lower prices are always beneficial to consumers. However, competition can appear in different dimensions and antitrust authorities must take these dimensions into consideration.

In the mid 1990s, the Innovation Markets debate enriched the discussion by adding the idea that a special future market should be taken into account by antitrust authorities when assessing the impact of a merger: the market of innovation.

The innovation markets analysis is motivated by the desire to "account for the importance of non-price, technological competition in merger review, thereby protecting the dynamic efficiency of the economy, especially in the high technology industries" (Rapp 1995).

The formal recognition of the "innovation markets" as an enforcement tool came in 1995 when Intellectual Property Guidelines announced the tripartite distinction among goods and services markets, technology markets and innovation markets.

The Intellectual Property Guidelines define an innovation market as:

"The research and development directed to particular new or improved goods or processes, and the close substitutes for that research and development. The close substitutes are research and development efforts, technologies and goods that significantly constrain the exercise of market power with respect to the relevant research and development, for example by limiting the ability or the incentive of a hypothetical monopolist to retard the pace of research and development. The Agencies will delineate an innovation market only when the capabilities to engage in relevant research and development can be associated with specialized assets or characteristics of specific firms."

In the present definition, several points are of special relevance. The exercise of market power from a hypothetical monopolist is framed in terms of retarding or reducing innovation efforts, but not in terms of price increase, as the focus changed to innovation competition. Innovation markets do not refer to a product market but to a market where "one prepares to sell innovative products some time in the future" (Davis 2003).

The potential effect of a merger on innovation can be analyzed in the product market or as a consequence of structural effects in the upstream innovation market. Even if a merger has no effect on the actual or potential competition in any relevant product market, it may however have adverse effects on consumers' wealth by reducing competition in innovation (Gilbert and Sunshine 1995). Under the innovation markets perspective, antitrust authorities should be concerned by mergers that have a negative effect on the resources devoted to R&D or on research lines if these reductions can have an adverse effect on price or non-price competition (Dahdouh and Montgoven 1995).

Innovation markets represent an anomaly for the antitrust policies (Davis 2003). Normally, antitrust authorities focus on encouraging the maximization of the output for a given level of input or on preventing artificial limitation in the output. Under the innovation markets approach, the focus is on on the input side, antitrust authorities favouring more R&D investments and/or more research lines.

However, the analysis of the input market, complementing the output analysis, can offer a richer perspective on the potential competitive impact of a merger. When a merger alters the incentives to innovate, an input analysis can better capture the economic consequences of that merger.

The practical application of the innovation market analysis poses concrete difficulties

(Carlton, 1995). The most critical problem is the identification of the boundaries of analysis. This task is further complicated by the fact that innovations come in many different forms and from diverse sources.

The M&As analysis under an innovation market perspective should be aimed at identifying three key effects (Gilbert and Sunshine 1995).

The first effect is to investigate if the merged firm has the ability to reduce total market investments in R&D. This is equivalent to the definition of the merged firms share in the relevant market in a horizontal product merger. The possibility of a company to benefit from a reduction in R&D expenditures is limited if other competitive innovative firms can easily increase their investment in R&D and would do that in response to the merged firm's reduction in R&D .

The second effect is to evaluate if the merged firms have the incentive to reduce the innovative effort. Even if the company has the ability to reduce research investments, it may not have the interest to do so. If the competition is high in other downstream products and from other firms that have the necessary assets, merged companies could have an interest in maintaining or increasing the actual level of R&D efforts.

The third effect is to determine if the merger may have an impact on the efficiency of the R&D expenditures. This analysis is similar to the valuation of the production efficiencies. The argument is that when merging firms possess complementary assets, they might be able to exploit economies of scale. The reduction of redundant R&D activities would lead to a cost reduction but not to a reduction in innovation.

Both the innovation markets and the efficiency defence approach are aimed at including

innovation concerns in M&A assessment. The path followed to reach the same objective is however different in, at least, two main aspects.

First, innovation markets approach focuses on a specific market, the market of innovation. In practical terms, this is translated into looking at the effects of the merger on the R&D activities. As R&D represents an input for innovation, the output market is not anymore the core of the authorities' analysis. On the other side, efficiency defence focuses on the output market of innovation considering mainly the potential effects of the transaction on new or improved products or processes.

Second, the scope of the efficiency defence is to allow transactions that would have been otherwise blocked because of the associated anticompetitive effects on the market. The scope of the innovation markets approach seems to be, on the contrary, to block mergers that could have a negative impact on the competition in innovation.

IV. The empirical analysis

The theoretical framework in the previous section has discussed the possibilities, the importance and the difficulties involved in incorporating efficiencies and innovative activity in merger policy. Distinctions have been made between the application of the innovation markets approach and the efficiency defence. The innovation market debate started ten years ago while the efficiency defence only in May 2004, date of enforcement of the new EC merger regulation. However, as reported by Miguel de la Mano already in 2002, dynamic

efficiency (and therefore innovation) considerations have been implicitly recognized and applied by the Commission before 2004.

This section reviews two recent horizontal acquisitions between high-tech companies analysing the decisions of both the US and the EU competition agencies.

IV.I. Pfizer acquires Pharmacia

Pfizer, headquartered in New Jersey, operates in the markets for pharmaceuticals, consumer health care and animal health products. It is one of the world's leading firms in these respective industries. Its annual revenues were 32 billion U.S. dollars in 2001. The target company is Pharmacia, also from the U.S., active in the same markets as Pfizer but also in fine chemicals. Its revenues were 13.8 billion U.S. dollars in 2001 of which 86% came from the sale of prescription pharmaceuticals. The newly formed company would be twice the size of its largest competitor (GlaxoSmithKline), with approximately $48 bn in revenues and an R&D budget of 7 billion U.S. dollars annually.

The sheer size of the transaction (about $60bn) in combination with the pre-acquisition position in the world market of both companies, but especially Pfizer's, and the overlap of the companies' activities makes it no surprise that regulation authorities started an in-depth investigation. Although the companies are headquartered in the U.S., the markets they operate in and therefore also the markets that are affected by the acquisition are global, meaning that it also fell under the jurisdiction of the EC.

The analysis involved determining in which specific markets or market segments both companies were active. This involved determining the relevant product markets as well as the

relevant geographical area. The position each company had in the market needed to be assessed including market shares and the type and degree of competition. This analysis was also performed for the post-acquisition period. Having this information, the authorities could compare the results with certain thresholds developed in antitrust law and jurisprudence. One of these thresholds, applied in the US, is an increase in the Herfindahl-Hirschmann Index (HHI)9 to a level above 1800. The EC also uses this index but considers the change in the HHI between the pre- and post merger situation to be more important than the absolute value of the index (European Horizontal Mergers Guidelines, 2004). When an acquisition exceeds one or more of these thresholds, authorities need to decide what measures (e.g. divestments) have to be taken.

These proceedings have taken place in the case of the acquisition of Pharmacia by Pfizer and the agencies have defined several markets in which competition concerns were raised. These markets are C2A Antihypertensives (of non-herbal origin) Plain, C8A Calcium Antagonist Plain, D4A Topical Antipruritics, G4B3 Erectile Dysfunction, H2A Plain Corticosteroids, J1F Macrolides & Similar Type and L1D Cytostatic Antibiotics.

Two of these markets included innovation and R&D concerns and are therefore of interest for the purposes of the present research: erectile dysfunctions and urinary incontinence.

In the market for erectile dysfunction products Pfizer was market leader with its product Viagra and has market shares ranging from 65% to 95% in various geographical markets (EEC regulation No 4064/89). Pharmacia was the only company developing products that can

[9] The HHI is calculated by summing the squares of the market shares of each firm in the market and hereby measures the level of concentration in a market. In a perfect competitive market its value is close to zero and in a monopoly its value is 10.000.

be classified as competitors of Viagra and sells the best alternative for Viagra (the product Caverject) and the acquisition would secure Pfizer's position in the market for the foreseeable future. The EC took pipeline products into account and was also concerned with patent litigation, whose outcome could have large effects on potential competition in the erectile dysfunction market. The FTC added to these concerns the effects on competition in this specific R&D market, innovation in this market and the possibility that Pfizer would have delayed or forewent the introduction of Pharmacia's pipeline products.

In the market for urinary incontinence Pharmacia sold its product Detrusitol and had market shares ranging from 35% to 100% (EEC regulation No 4064/89, 2003) with only few competitors. Pfizer was one of the two companies that were in the development stage of similar products and thereby able to compete in the near future. The EC took into account that several companies were developing competing products. Pfizer's leading position in the development process and its strong overall position in the market combined with Pharmacia's already marketed product raised serious concerns for competition in the future. The FTC (Complaint Docket No C- 4075, analysis of proposed consent order, File No 021 0192) drew a similar conclusion but also noted the effect the acquisition had on competition in this R&D market, the effects on innovation and the possibility that Pfizer would have delayed or foregone the launch of its product under development. This conclusion was very similar to that of the erectile dysfunction market.

As a result of the concerns raised, the companies needed to take measures in order to complete the proposed transaction. For the markets under discussion, Pfizer and Pharmacia have agreed with the FTC to return or sell the rights of their two pipeline products for the erectile dysfunction market and to divest Pfizer's product in development for the OAB

market. A similar commitment was made to the EC.

IV.2.Novartis AG and Astra Zeneca PLC create Syngenta AG

The case of Novartis and Astra Zeneca involves the creation of the joint venture Syngenta, whose most important markets were those for fungicide and herbicide products. The new company is the largest in the agribusiness sector with annual sales projected at eight billion dollars. Though this transaction could not be strictly classified as a merger or acquisition, it involved the transfer of agribusiness parts of both companies to a new entity. This can have similar results on competition and consumer welfare as a merger. Since both companies were active players in this market, both with marketed products, R&D activities, and combined market shares of up to 90 % (EEC Regulation No 4064/89, 2000), competition concerns were raised by the authorities. Novartis and Astra Zeneca are both located in Europe, but the markets they operate in are global resulting in the involvement of not only the EC but also the FTC. The analysis of the FTC (Complaint Docket No. C-3979, Analysis of the complaint, File No. 001 0082) was however more limited because only the markets for fungicides and herbicides were considered relevant.

The market analysis of the EC was very extensive in this case, since five general product markets are considered[10,]. Since only innovative and efficiency concerns are of interest to this paper, we only focus. on markets where these factors have played a role, without going in depth in analysing all the market segments

Both companies were producing and developing fungicide products similar to those of their

[10] Herbicides, fungicides, insecticides, plant growth regulators and seed treatment for cereals in Spain.

major competitors BASF, Aventis and Bayer. The major concern in this market regards strobilurin products, since Novartis has recently started marketing this product as the only company in the market. Within an appropriate time period only BASF and Astra Zeneca are potential competitors, creating a dominant position for the new entity. In this context the EC has neglected any consideration about future competition concluding that only BASF can be considered a potential competitor to the new entity (although Bayer was also in the R&D stage of a possible competitive product).

The products in the market are heterogeneous which creates the need for farmers to use several products in their spraying policy. Because the merger would have led to a significant increase in products produced by Syngenta, the company had the possibility to create "new, potentially very successful mixtures" to further increase its position in the market (Regulation (EEC) No 4064/89 Merger Procedure). With the acquisition, the number of rival companies was reduced from three to two, which reduced the competition in the R&D for these products and could have reduced innovation incentives. Another effect that deteriorates the competitors' positions was that both companies had agreements with competitors for creating and selling mixtures that combined products from the two firms. The ability of Syngenta to produce these mixtures unilaterally might have caused the cancellation of this cooperation, thereby reducing the portfolio of the other firms in the market. Finally, the EC concluded that Syngenta produces economically viable products, whereas the potential of newly introduced products by its rivals was limited. The FTC had determined similar concerns pointing out that there were several relevant markets in which the transactions needed to be analyzed namely: 1) the research, development manufacture and sales of pre-emergent herbicide for control in grassy weed corns and 2) the research, development, manufacture and sale of foliar fungicides

for the treatment of diseases in cereals, citrus, cotton, peanuts, potatoes, rice, vegetables and turf.

Both companies were producing and developing products for the herbicide market and both were large players in this market. This position was strengthened by the argument that current and future products of Syngenta's competitors (excluding isoxaflutole) were unlikely to challenge the joint venture's position in the maize herbicide market. The EC's argument concerning Syngenta's new possibilities was similar to the one in the fungicide market. The combination of products that could be offered in the post-merger situation provided broad coverage of the market. The loss of cooperation between the two competitors and their rivals also created similar concerns in this market as it did in the market for fungicides. The EC added to this argument that, because of the possibilities to create ready mix products, Syngenta could extend the status of products that were no longer patented. This had the consequence of increasing the company's position in the market further. The final argument discussed here concerns the cereal herbicide market. The EC stated that even though the market shares did not give rise to competition concerns, introduction of products that are under development by Syngenta in the nearby future could have changed this. But according to the EC this effect was not significant enough to create a dominant position. The FTC reached similar concerns but it added that the transaction would significantly lessen R&D efforts in developing herbicides and fungicides and would have created significant barriers to entry for both the herbicide and fungicide market.

The conclusions in the remaining three relevant product markets are less significant to the investigation and are therefore more briefly discussed in this paragraph. In the insecticides market the EC concluded that Novartis is in the process of introducing two new products (and

one of these has high potential, because of it contains new characteristics) while the impact of new products introduced by rivals was considered limited. In the market for plant growth stimulators Syngenta was a major player and the main consideration made here was that two of three most important brands in the market were produced by Syngenta in the post-merger situation. In the market of seed treatment for cereals in Spain, the parties argued that the position of Syngenta is weak because of the use of the off-patented substance maneb, which was essential for the firm's business in this market. The commission refuted this argument.

In their defence, the companies argued about the definition of the relevant and geographical markets as well as the competition in the markets. This however did not change the opinion of the authorities that a dominant position was created in several markets.As a consequence, Novartis and Astra Zeneca had to divest parts of their companies in order to gain the authorities' approval.

V. Results

The analysis has provided insight in the factors considered by the competition authorities to determine whether or not a dominant market position is created. In the markets assessment, the main factors have been the position of the two companies and that of their competitors in the market. Effects on consumer welfare are approximated by these factors because of the indirect relation between market dominance and consumer surplus.

It is interesting to note that the FTC has regularly included in the analysis the transaction's impact on the specific innovation market. Consistent with the theoretical framework presented, the FTC has considered the effect of M&As on R&D efforts. If an acquisition was

considered to have the potential to reduce the R&D of the merging parties, or to reduce competition in R&D activities among remaining firms, the FTC has concluded that the acquisition had a negative impact on innovation in the market. This consideration has been applied in both of the cases that have been discusses above.

Thus, the FTC has adopted a broad perspective considering not only current R&D activities of the parties involved in the merger but also the effects of their merger on the incentives to perform R&D for other players in the market.

The competition in the manufacture and sale of products (case Pfizer/Pharmacia) has also been an element of valuation. In the specific Pfizer/Pharmacia analysis, the FTC has concluded that the transaction would have been likely to delay or forgo the launch of new products for the treatment of the diseases presented in the case. As a consequence, the merger would have reduced additional, future price competition that otherwise would have been present. The above arguments are consistent with a future oriented perspective and with the innovation markets approach. These cases confirm the relevance of this approach in the FTC analysis.

Competition in R&D for specific products was, in small measure, also used by the EC in its market assessment, as shown by the fact that it investigated the herbicide and fungicide markets. This is mainly based on the effects it will have for future competition in the current market. However, some comments made about the Pfizer/Pharmacia case show that the EC is concerned about the effects an acquisition can have on innovation incentives, thereby recognizing that innovation can have an impact on market concentration and dominance. The guidelines followed by the EC, especially in relationship with the efficiency defence argument are less systematic, however. The EC clearly considers the products that are in an

advanced stage of development as highlighted in the above-mentioned empirical analysis. Products that are in an early stage of development are, however, considered to be less important[11], mainly because of the uncertainty involved and the difficulty in estimating the effects on the market due to the long time horizon. This means that the EC has specified a time frame in which the effects on the market are analyzed[12], but its length varies per market.

Though products in development are considered, completely new products are not mentioned in the analysis. The EC considers improvements of products and the introduction of new mixtures but there is no mentioning of future good markets.

The comparison between the criteria adopted in the U.S. and in the EU shows that the efficiency defence arguments are at an embryonic stage in Europe while the application of innovation markets doctrine is already in a more consolidated phase in U.S., after more than one decade of debate on its validity.

It is remarkable to note that both agencies have reached similar decisions in order to allow the transactions at stake. This seems to suggest that the two approaches are more distant from a theoretical perspective than from a practical point of view. However, this consideration could be case-specific.so that it would not be meaningful to drive significant conclusions without further analyses.

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[11] This follows from the EC's decision in the case of Ciba-Geigy/Sandoz (case M.737 – Ciba-Geigy/Sandoz, Commission decision of 4.2.1998), where it was determined that in pharmaceutical sector success rates are estimated at no more than 10 percent for Phase I projects, 30 percent for Phase II projects and about 50 percent for Phase III projects.

[12] This follows from paragraph 144 of the merger procedure for EC case Novartis/Astra Zeneca No. M.1806, where the EC considered the introduction of Bayer's strobilurin product too distant.

VI Conclusions

Over the last few decades, the importance of innovation for economic as well as social wealth has been increasingly recognised. This has also given rise to a demand for expanding the analysis of merger or concentration policy which, until recently, was almost exclusively concerned with static efficiencies.

In this respect, two main approaches have been presented: the innovation markets doctrine developed in the United States, and the efficiency defence approach, adopted in the Europe Union.

From a theoretical perspective, the present paper suggests that an integration of the two approaches would significantly improve the assessment of mergers in two ways.

First, such an integration would allow a more comprehensive analysis of a merger's impact because the innovation markets approach would focus on the inputs to R&D while an assessment of an efficiency defence, if invoked, would measure the effects on innovation in the output market (new/improved products and processes).

Second, the risk of errors (type I and II) could be reduced. If an efficiency defence is accepted, a merger that otherwise would have been blocked now receives a go-ahead. Under the innovation markets standard, mergers that are likely to have detrimental effects on innovation will be blocked—even if they do not raise concerns from a perspective which focuses on the current market structure. Therefore, integration would lead to more balanced decisions.

This paper has contributed to the understanding of the relevance of innovation concerns in current merger assessments. By using cases that have been assessed by both the FTC and the

EC, the present study also allows a comparison of the relative importance given by the two authorities to the arguments mentioned.

The FTC is future oriented and includes innovation markets analysis in its considerations. The guidelines followed by the EC, on the other hand, are more case specific. The weight with which the EC considers efficiency arguments in its final decision is limited, especially in cases where market concentration and dominance are not directly affected by efficiencies or innovation activities. Thus, the EC maintains its focus on anticompetitive effects and excludes most effects that do not change market concentration or dominance but affect consumer welfare. This is an important omission, even from the viewpoint of the Commission itself as it is frequently stressed that the protection of consumer welfare is paramount.

Part of the results obtained and the conclusions drawn are influenced by the context in which the analysis has been performed and, in particular, by the lack of more numerous cases analyzed by both FTC and EC where efficiency is effectively alleged. This consideration remains as recommendation for future research.

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